

JAPANESE

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CLAIMS DETAILED DESCRIPTION TECHNICAL  
FIELD PRIOR ART EFFECT OF THE INVENTION  
TECHNICAL PROBLEM MEANS DESCRIPTION OF  
DRAWINGS DRAWINGS

[Translation done.]

## \* NOTICES \*

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

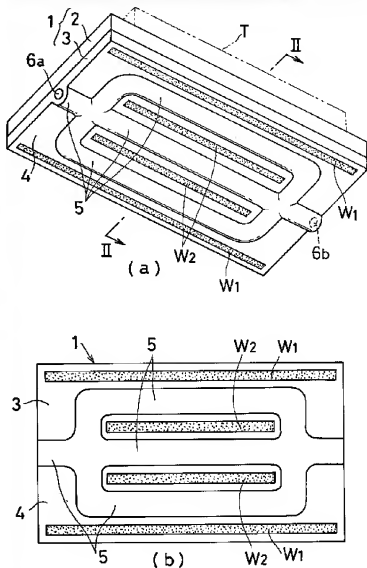
[Field of the Invention] This invention relates to the back up plate for sputtering used suitably for PATTA ring devices, such as a magnetron sputtering system used, for example in the case of manufacture of a liquid crystal panel.

[0002]

[Description of the Prior Art] For example, as shown in drawing 5, the back up plate (51) which attaches targets (T'), such as an ITO (Indium Tin Oxide) sintered compact, to the surface is used for the magnetron sputtering system. This back up plate (51) has a cooling-medium circulation way (54) in that inside, in order to cool the target (T') attached to the surface, as shown in drawing 6. The magnet which impresses a magnetic field to sputtered particles and which is not illustrated is arranged at the rear-face side of the back up plate (51).

[0003] As the metal plate (52) and (53) of two sheets consists of clad metal stretched by one and the conventional back up plate (51) is shown in drawing 6. While the slot for cooling-medium circulation way formation (54a) (54b) is

Drawing selection Drawing 1



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formed in the mating face (55) of both metal plates (52) and (53), respectively. When both the metal plates (52) and (53) are set and uniting is carried out by welding (weld zone W1', W2'), the circuit-like cooling-medium circulation way (54) is formed in the inside. And in the cooling-medium circulation way (54) of this back up plate (51), the cooling medium (not shown) poured in before both the metal plates (52) and (53) were welded is enclosed.

[0004]By the way, the cooling-medium circulation way (54) of the conventional back up plate (51) comprises a slot for cooling-medium circulation way formation (54a) (54b), as mentioned above, but. These slots (54a) (54b) were formed by pressing conventionally with the forming mold which has a male mold corresponding to this slot for the mating face (55) of each metal plate (52) and (53).

[0005]

[Problem(s) to be Solved by the Invention]However, since the expensive forming mold had to be used in order that the above-mentioned conventional back up plate (51) might form the slot for cooling-medium circulation way formation (54a) (54b), there was a fault that the manufacturing cost will be attached highly. The slot especially for cooling-medium circulation way formation (54a) (54b), In order to raise cooling efficiency, it is preferred to form in the shape of [ complicated ] a circuit, but since the forming mold which has a complicated male mold corresponding to the circuit shape of that slot (54a) (54b) will be used in this case, a manufacturing cost will be attached highly increasingly.

[0006]The above-mentioned conventional back up plate (51), In order that the cooling medium enclosed in the cooling-medium circulation way (54) may prevent sinking into a mating face (55) and leaking out outside, the abbreviated perimeter of the periphery of both metal plates (52) and (53) must be welded (weld zone W1') -- this sake -- the case with troublesome welding operation where it carries out and a cooling medium consists of fluids -- a weld zone (W1') -- liquid -- so that it may become dense, Since it must weld firmly so that a weld zone (W1') may become airtight when a cooling medium consists of gases, welding operation becomes increasingly troublesome. If weld flaws, such as a non-weld zone, exist in a weld zone (W1'), a cooling medium should leak out from this weld flaw part, and the problem of the atmosphere in a device being polluted for this reason, and it becoming impossible to acquire a good film formation condition should arise.

[0007]Since it is necessary to carry out alignment of the metal plate (52) and (53) of two sheets strictly so that corresponding slots (54a) (54b) may be in agreement, when welding, Since the fixing device which prevents a position gap of both metal plates (52) and (53) is needed separately,

also in this point, a manufacturing cost will be attached highly, and welding operation becomes troublesome.

[0008]This invention was made in order to solve such a difficulty, and an object of an invention is to provide the back up plate for sputtering which can be manufactured easily.

[0009]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, a tabular cooling unit to which the back up plate for sputtering concerning this invention has a cooling-medium circulation way inside at a tabular base part is stretched by welding.

[0010]According to this, since a cooling-medium circulation way is formed in an inside of a cooling unit, when welding a cooling unit to a base part, the time of necessarily not welding the abbreviated perimeter of a periphery of a cooling unit, and becoming, therefore welding by welding operation becoming easy -- a weld zone -- \*\*\*\*\* -- since it becomes unnecessary to weld so that it may become airtight, welding operation becomes still easier. Since there should be no break through of a cooling medium from this weld flaw part even if it is a case where a weld flaw exists in a weld zone, it becomes, without polluting atmosphere in a device, therefore a good film formation condition can be maintained certainly. Since it is not necessary to carry out alignment of both strictly when welding a cooling unit to a base part, it becomes unnecessary to not necessarily use a fixing device which prevents both position gap therefore, and welding operation becomes still easier. A cost hike is not invited even if it is a case where a cooling-medium circulation way of the shape of a complicated circuit is formed, since it is not necessary to use an expensive forming mold from the first in order to form a cooling-medium circulation way.

[0011]

[Embodiment of the Invention]Next, the embodiment of this invention is described based on a drawing.

[0012]Drawing 1 and drawing 2 show one embodiment of this invention. In the figure, (1) is the back up plate for sputtering of this embodiment.

[0013]This back up plate (1) consists of a base part (2) plate-like [ rectangular ] and a cooling unit (3) of the same size as this base part (2) plate-like [ rectangular ]. And while a target (T) is attached to the surface of said base part (2), said cooling unit (3) is stretched by one by welding (the weld zone W1 and W2) at the rear face.

[0014]Said base part (2) consists of a metal plate with flat rear surface both sides, and the aluminum (it is [ the following containing that alloy ] the same) board is used by this embodiment as that metal plate. This base part (2) has

predetermined thickness so that it may not be crooked, when said cooling unit (3) is pasted together by welding.

[0015] Said cooling unit (3) consists of a roll bond panel made from aluminum (4) in which the circuit-like bulge tube part (5) is formed in the approximately whole area.

[0016] The roll bond panel (4) which constitutes this cooling unit (3), If it was manufactured in accordance with the conventional method and the manufacturing method is explained briefly, By printing a sticking-by-pressure inhibitor to a prescribed pattern, pasting together and sticking the aluminum plate of the other to this field by pressure, and uniting both boards with the aluminum plate of either of the aluminum plates of two sheets, consider it as clad metal and it ranks second, By introducing hydrostatic pressure into a non-compression bonding part, and bulging a non-compression bonding part, the bulge tube part (5) according to a printing pattern is formed in a mating face.

[0017] The bulge tube part (5) of this roll bond panel (4) bulges only in the one side side, and makes that internal hollow part a cooling-medium circulation way (6). And in the end surface of the length direction of this panel (4). While the cooling-medium input (6a) which consists of an end opening of a bulge tube part (5) is formed, in the end face of an opposite hand. The cooling-medium tap hole (6b) which similarly consists of an other end opening of a bulge tube part (5) is formed, and a cooling medium flows into a cooling-medium circulation way (6) from input (6a), and flows into a tap hole (6b). And flat one side of the other side of this roll bond panel (4) contacts a field contact state at the rear face of said base part (2), and in and this state. Welding adherence of the portion in which the bulge tube part (5) in the edge section of the cross direction of a panel (4) and the center section of the panel (4) is not formed is carried out at the base part (2).

[0018] This welding is performed from the rear-face side of a roll bond panel (4), and as that welding means, For example, inserting in a weld zone the pin shape probe which can adopt the welding process using high-energy-density heat sources, such as laser welding and electron beam welding, and is rotated, softening a contact portion with a probe with frictional heat, and agitating. The friction-stir-joining method welded by moving a probe along with a weld zone by an insertion condition is employable.

According to the welding process using a high-energy-density heat source, there is an advantage that it can weld at high speed, and according to the friction-stir-joining method. Since it is a kind of a solid-state-welding method, there is an advantage that the heat distortion at the time of welding which can join dissimilar metals, and generating of curvature can be controlled etc.

[0019] Thus, by carrying out uniting of the cooling unit (3)

which consists of roll bond panels (4), and the base part (2) by a field contact state, The back up plate (1) which could prevent decline in the thermal conductivity produced by the crevice formed among both, therefore was obtained has high refrigeration capacity.

[0020] Since it is not necessary to carry out alignment of both correctly when welding a cooling unit (3) and a base part (2), even if it does not use a fixing device as a position gap prevention means, it can end, therefore welding operation can be performed easily. since what is necessary is just to weld to such an extent that the field contact state of a cooling unit (3) and a base part (2) can be held, the time which is several welding, and ends, therefore welding takes becomes short, and welding operation efficiency is markedly alike and improves.

[0021] This back up plate (1) can be used like the conventional thing. That is, if this is explained briefly, the back up plate (1) will be arranged to the prescribed position of a sputtering system, and a target (T) will be attached to it on the surface of a base part (2). And membranes are formed, pouring a cooling medium on the cooling-medium circulation way (6) which consists of a centrum of the bulge tube part (5) of a cooling unit (3). Here, since there will be no possibility that a cooling medium may leak out outside even if weld flaws, such as a non-weld zone, exist in the weld zone (W1, W2), atmosphere at the time of membrane formation is not polluted, therefore the good sputter film of membraneous quality can be formed certainly.

[0022] Since both the base parts (2) and cooling units (3) that constitute this back up plate (1) consist of aluminum, they are quite lightweight. Although that weight saving is especially needed with enlargement of the back up plate (1) in recent years, the weight saving of the back up plate (1) needed can be attained by both manufacturing a base part (2) and a cooling unit (3) from aluminum like this embodiment.

[0023] Since a cooling unit (3) consists of roll bond panels (4), the circuit form of the cooling-medium circulation way (6) formed in that inside can be made more complicated in addition to what was shown in this embodiment, and can form such a complicated circuit easily. It is because what is necessary is just to print a sticking-by-pressure inhibitor so that a bulge tube part (5) may become a complicated circuit. Therefore, by using a roll bond panel (4) as a cooling unit (3) like this embodiment, The back up plate (1) which has the refrigeration capacity which could manufacture easily the cooling unit (3) which has a cooling-medium circulation way (6) used as a complicated circuit inside, that is, was excellent can be manufactured easily. As a result, the manufacturing cost of the back up plate (1) can be downed substantially.

[0024]The back up plate which \*\* and is applied to this invention is not limited to the thing of the above-mentioned embodiment, but a setting variation is variously possible for it.

[0025]For example, the back up plate concerning this invention may be shown in [drawing 3](#) and [drawing 4](#). It is as follows, when the same numerals are given to the figure at the same element as the back up plate of the above-mentioned embodiment and the composition of the back up plate (1) shown in the figure is explained briefly.

[0026]That is, as shown in [drawing 4](#), the slot (2a) corresponding to the bulge tube part (5) of the roll bond panel (4) which constitutes a cooling unit (3) is established in the rear face of the base part (2) of this back up plate (1). And a roll bond panel (4) is stretched by one by welding (the weld zone W1 and W2) at the rear face of a base part (2) by the field contact state to which the bulge tube part (5) of the roll bond panel (4) fitted into the slot (2a) of the rear face of this base part (2) exactly.

[0027]This invention is not limited to the thing of these two embodiments. For example, the roll bond panel (4) which constitutes a cooling unit (3) may be a copper thing. Thus, by using copper roll bond panels, thermal conductivity becomes good, therefore the refrigeration capacity of the back up plate (1) will improve further. When welding dissimilar metals in this way, it is desirable to adopt the above-mentioned friction-stir-joining method at the point which can carry out uniting of a cooling unit (3) and the base part (2) firmly.

[0028]The cooling unit (3) does not need to consist of roll bond panels, and the metallic pipe for cooling-medium circulation ways may be attached to a plate-like metal plate by welding. In this case, it is preferred by establishing the slot corresponding to the outer diameter of a metallic pipe in the rear face of the metal plate, making a metallic pipe there be along this slot, and fitting into it to embed a metallic pipe at a metal plate. As for said metallic pipe, in order to obtain uniform cooling, being crooked in meandering state etc. is preferred.

[0029]

[Effect of the Invention]By above-mentioned order, since the tabular cooling unit which has a cooling-medium circulation way inside is stretched by the tabular base part by welding, the back up plate for sputtering concerning this invention is faced manufacturing this back up plate, and makes the following effects it. namely, -- when welding a cooling unit to a base part, \*\* it is not necessary to necessarily weld the abbreviated perimeter of the periphery of a cooling unit, and it becomes, therefore welding operation becomes easy -- a weld zone -- \*\*\*\*\* -- since it

is not necessary to weld so that it may become airtight, welding operation becomes still easier. Since there should be no break through of the cooling medium from this weld flaw part even if it is a case where a weld flaw exists in a weld zone, it becomes, without polluting the atmosphere in a device, therefore a good film formation condition can be maintained certainly. Since it is not necessary to carry out alignment of a base part and the cooling unit strictly, it becomes unnecessary to not necessarily use the fixing device which prevents both position gap therefore, and welding operation becomes still easier. A cost hike is not invited even if it is a case where the cooling-medium circulation way of the shape of a complicated circuit is formed, since it is not necessary to use an expensive forming mold from the first in order to form a cooling-medium circulation way. Therefore, according to this invention, the effect that the back up plate provided with the cooling-medium circulation way of the shape of a complicated circuit which is got blocked and has high cooling efficiency can be manufactured easily without inviting a cost hike is done so.

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